

Market Assessment 2008

A Review of Niche Market Penetration, Opportunities and Challenges

NGVTF Meeting – Downey, CA
November 19-20, 2008

Stephe Yborra
Director of Market Analysis, Education & Communications
Clean Vehicle Education Foundation

Director of Marketing & Communications
NGVAmerica

***“Roadmap For Development of
NGV Fueling Infrastructure
and
Analysis of Vehicular
Natural Gas Consumption by Niche Sector”***

- Underwritten by US DOE, through NETL
- Prepared by Clean Vehicle Education Foundation
 - Data collection and analyses: May 2006 - July 2007
 - Report submitted August 2007
- This 2008 update based on extrapolations of data collected for 2005 summary and anecdotal info

Scope of Work

- Roadmap
 - Document CNG and LNG infrastructure development to date, assess critical factors, define challenges and opportunities and lessons learned to accelerate future public infrastructure development...
- Data Collection
 - Quantify 2005 US vehicular natural gas consumption (CNG and LNG) by top niche sectors, by state and region
 - Report defined underlying problem with current data, assessed past/present data collection methodologies and investigated/evaluated potentially better approaches

Summary of Data

- Net total of 892 stations listed fuel use for 2005
 - Down from 1250 stations listed in '97 analyses
 - Additional stations exist but have very little or no fuel use
 - Station count = approximately 82% of ~1100 total stations believed to be in existence (including mfg/warehouse sites)
 - Widely quoted 1300-1500 stations not supported by the data
 - Survey data capture estimated at 95+% of fuel throughput
- Current estimate is up only slightly due to trade-off between attrition of underutilized stations and development of new ones
 - While upgrades/investments in existing stations improve fueling infrastructure, they do not increase station counts

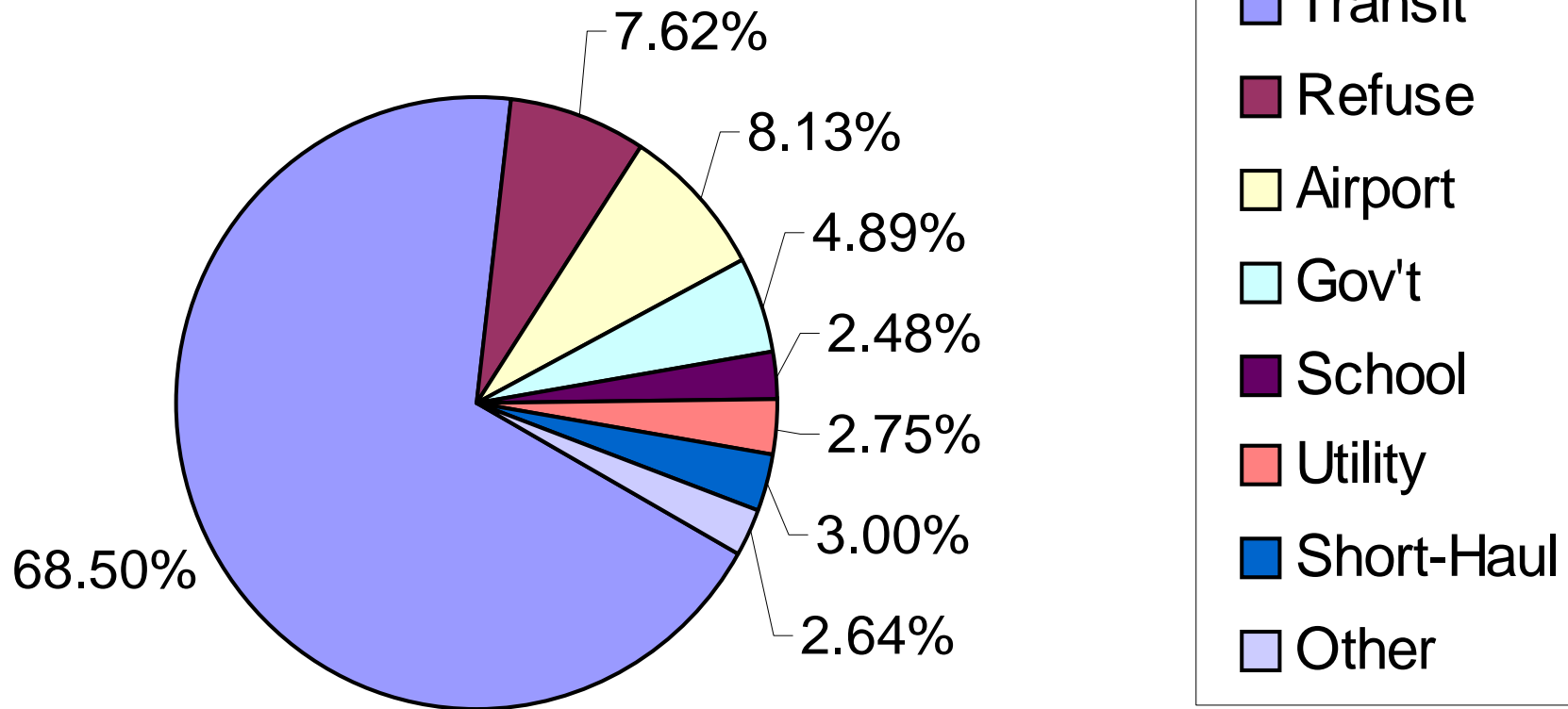
Summary of Data

- Fuel use grew slowly but steadily til 2003-04, then more rapidly as focus shifted more to high-fuel-use HDV accounts
 - 2005 = 200 million GGE (LNG:40 million GGE; CNG: 160 million GGE)
 - 2007 likely surpassed 230 million GGE; 2008 may achieve 275 million GGE
 - MDV/HDVs up; attrition of LDVs (many bi-fuel)
- Historically, vehicle counts have been overestimated
 - Inventory likely peaked at 110-115K in 2003, then dropped to 110K by 2005; now estimated at 105K (new HDVs do not match attrition of LDVs)

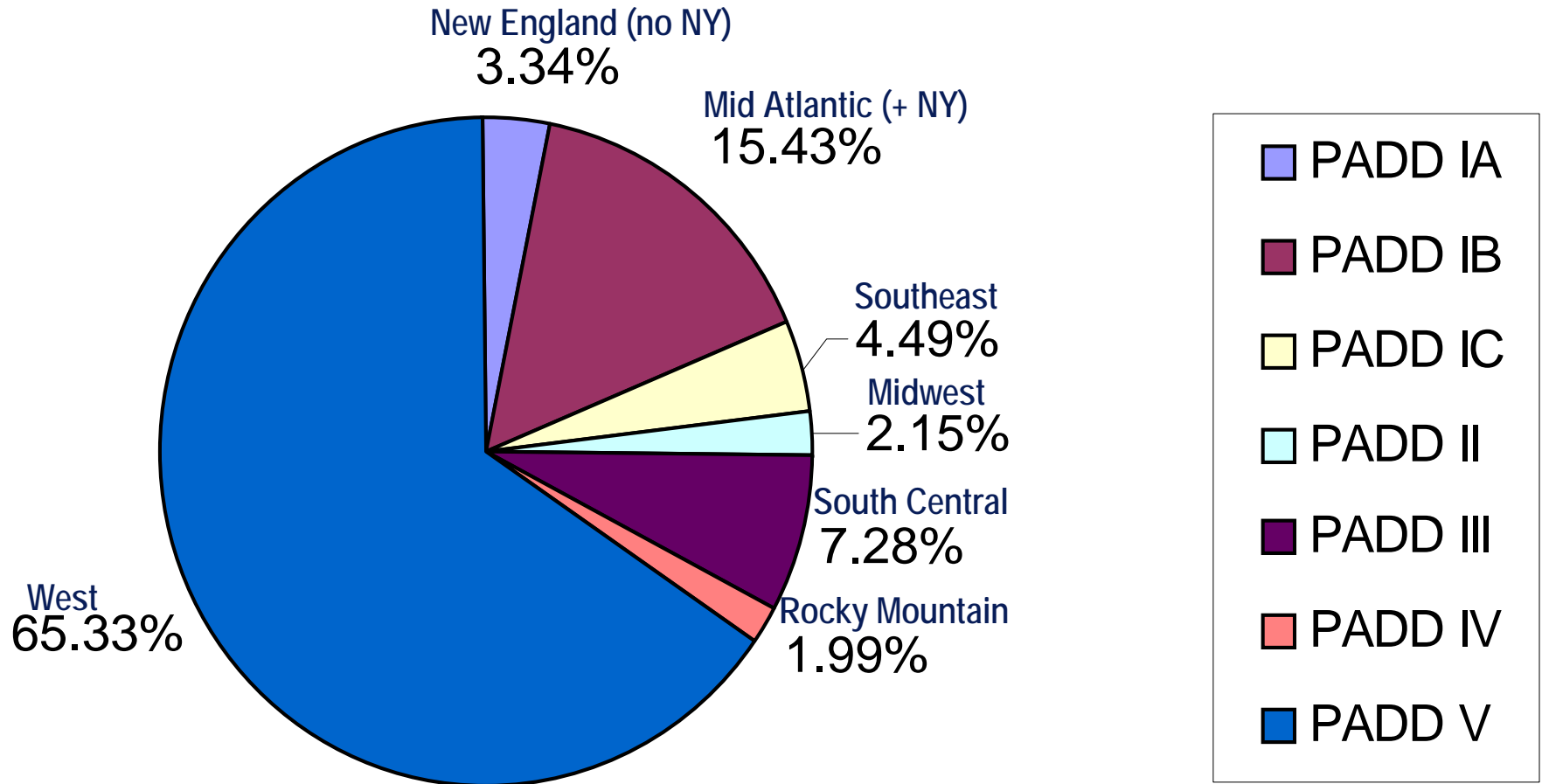
Summary of Data

- 110K NGV market composition in 2005:
 - 12-14K HDVs (now estimated @ 16-18K)
(8500-9000 transit, (now estimated @ 10,000); 1500 refuse (now estimated @ 3000), 2300 school bus (now estimated @ 2800), 1600-2000 in other public and private fleet applications (likely has decreased slightly due to attrition of older vehicle inventory))
 - 14-16K MDVs (now estimated @ 16-18K)
(airport shuttles, community transit, package delivery and other step-vans, miscellaneous PW trucks)
 - 70-80K LDVs (now estimated at 65-75K)

Vehicular Natural Gas by Niche Sector US Total

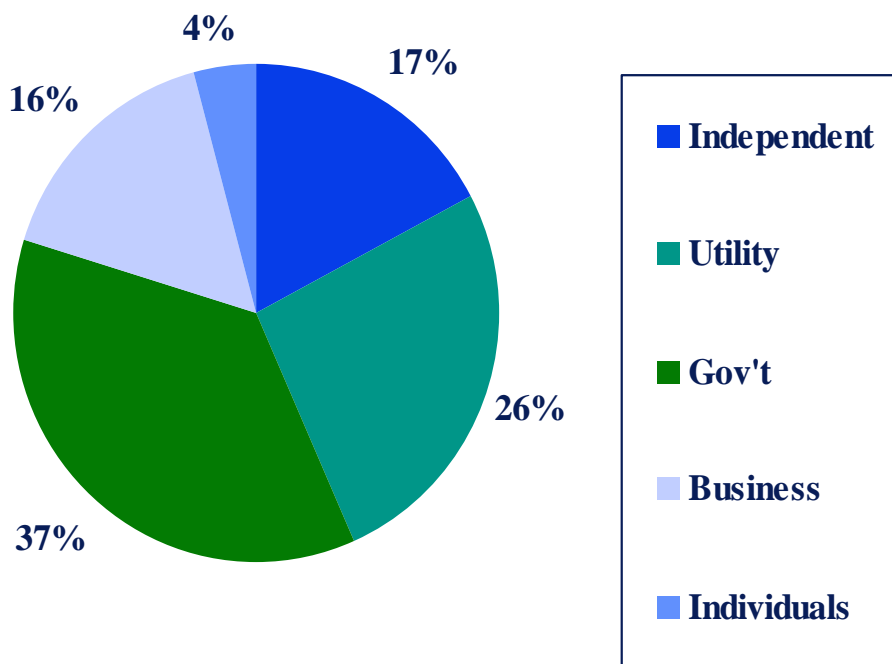


Vehicular Natural Gas Use by PADD



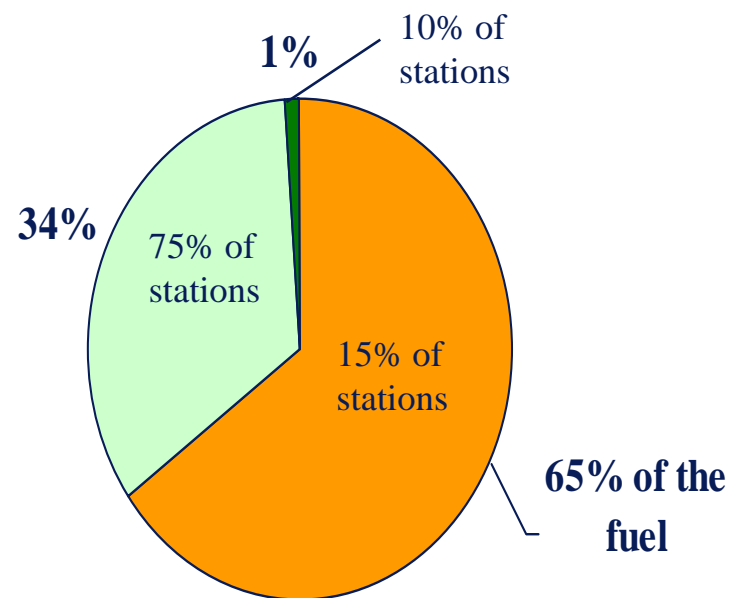
Who Owns and Operates Existing Stations?

(2005)



Which Stations Pump How Much Fuel?

(2005)

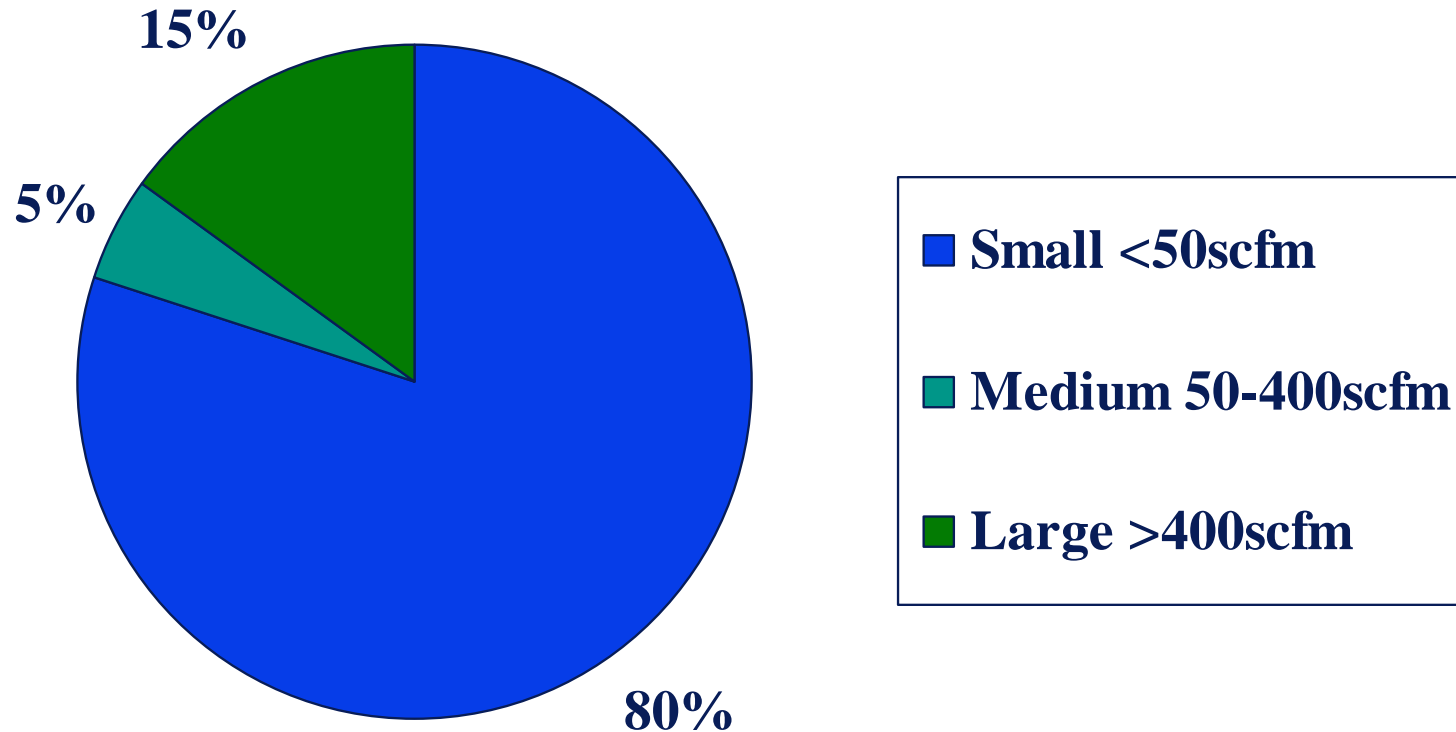


Roadmap

- Status of current fueling Infrastructure
 - Who owns and operates, Which stations pump the fuel?
What is the station utilization?
 - The prospects for dormant and/or grossly underutilized stations
 - Many have minimal prospects for increased throughput.
 - Many are in need of significant investment to be viable
 - Additional attrition is likely as market continues “correction.”
 - Review of new CNG station development
 - About 100 new “stations” in 2004-2007

Station Development 2004-2007

(100 new stations – does not include “reinvigoration” of existing stations)



25% were new stations for existing clients

60% were new stations for new clients

15% were new retail stations developed by independents

Roadmap

- Chronicled history of NGV market growth, divided it into four distinct periods
 - 1965-1990, 1990-1997 , 1997-2005, 2005-2007
- Evaluated factors affecting market development
 - Policy (market pull and market push)
 - Financial
 - Logistical/Operational
- Documented trends and offered recommendations about how market might develop more robustly

Roadmap

- Station development, ownership and operation trends
 - Limited amount of “new” CNG station development
 - Investment in existing CNG station infrastructure, mostly by independents acquiring sites, although some utilities still active
 - HDV fleets, larger stations get greatest effort due to more OEM choices, favorable economics
 - Small station equipment sales are down due to lack of OEM LDVs
 - “Pooling” throughput: retail stations, anchor fleets and addition of “outside-the-fence” fueling at existing private access anchor locations
 - Independents target prospects with $> 250,000$ GGE but fleet O&O station economics are favorable at lower throughput thresholds

Technical Issues

- Comprehensive Codes & Standards in place (vehicle and tank design, manufacturing, installation, safety)
(Recent increase in illegal conversions is of growing concern)
- Engine emissions, power, reliability improved
(Additional R&D is needed to get even better performance but current products are already “industry leading”)
- Station design/installation practices improved
(ES&S’ “packaged systems” for 40-150K GGE accounts may help reduce costs, cut lag time and speed market entry)
- Onboard and station fuel storage is still very expensive
(Still an issue, especially in LDV market entry)

Technical Issues

- Integration of available engines into OEM's MDVs and HDVs is expensive and delayed due to allocation of engineering resources to other more pressing "bread & butter" (diesel) concerns
(Much progress made but OEM investment is still limited by "bigger fish to fry")
- LDV conversion/retrofit system certification requirements and costs are burdensome and limit product choices
(Still an issue to resolve; lack of consensus within our industry)
- Loss of certified small industrial engines has left some mfrs in a bind (e.g. sweeper market needs certified auxiliary engine for vacs)

Recommendations

- Public statements from Administration about NGVs' role in support of national goals
- Issue private fleet and local gov't AFV purchase requirements as authorized under EPACT (DELETED from final report)
- Reinstate federal NGV RDD&D funds
- Increase available grants for vehicles, fuel stations
- Revise tax credits to enable tax exempts to benefit
- Extend tax credits to instill market confidence

Recommendations

- Re-engage major automotive OEMs to produce *and market* light- and medium-duty NGVs
- Create consortia to facilitate truck chassis OEMs' introduction of factory-built HDVs
- Expand sales-marketing programs targeting medium-fuel-use fleets (40-150K GGE/year)
- Provide added incentives for fleets that install outside-the-fence public access capability
- Expand current NGV stakeholder network
- Seek new/enhanced Fed tax credits for CNG, LNG and L/CNG infrastructure network

Natural Gas Powered Engines and Vehicles

[<http://www.ngvamerica.org/pdfs/marketplace/MP.Analyses.NGVs-a.pdf>]

- American Honda –Civic GX
- BAF Technologies (Ford)
 - 4.6L (Crown Vic/Gr. Marquis/Town Car)
 - 5.4L (E350 passenger and cargo vans; F150/250/350 pick-ups trucks + C/C)
 - 6.8L (E-450 cutaway)
- Baytech Corporation (GM)
 - 6.0L Pick-ups, vans, cutaways, W3500/4500 CF, Isuzu NPR/NPR HD, Workhorse W42)
 - 8.1L C4500-8500 Topkick; Workhorse W62
- FuelTek (Ford)
 - 5.4L (bi-fuel F250/350 pick-ups + C/C)
- IMPCO (GM)
 - 6.0L (bi-fuel) LD pick-ups and vans
- NaturalDrive (GM)
 - 3.5L, 3.9L Impala (dedicated)
- Cummins Westport
 - 5.9L “B Gas Plus” – 195-230hp (Shuttles, sweepers, work trucks)
 - 8.9L “ISL-G” – 250-320hp (Refuse, bus and work trucks)
- Emission Solutions Inc.
 - 7.6L Phoenix NG – 175-265hp (re-power Int’l DT466, MaxxForceDT)
 - 9.0L 300-330Hp engine certs are in process, due in 2008
- Westport Innovations Inc
 - 15L “ISX-Gas” – 400/450hp



What Other Engines and Vehicle Platforms Are Needed?



- Low cost LDVs (Cobalt, Focus, Malibu, Caliber, etc)
 - Civic GX is excellent vehicle for supervisor level but viewed as “too high-end” for many private and gov’t fleets’ low-level employees
 - Private: Utilities acct sales, courier services
 - Gov’t: code inspectors, case workers
 - Opportunity to capture more of the consumer market

What Other Engines and Vehicle Platforms Are Needed?

- Develop CNG version of Type C/ (conventional style) school bus such as Blue Bird Vision or Thomas Bus Saf-T-Liner C2
 - CWI is OEM for Type D/transit style buses
 - Current 5.9L B Gas Plus is too small and/or configured differently than diesel B (6.7L engine). ISL-G is too big for low profile
- Estimated “pent-up” orders >1000
- Both OEMs need engineering manpower and crash test funding



What Other Engines and Vehicle Platforms Are Needed?



- Light-Medium-Duty Walk-in/Step Vans
 - Currently, Workhorse (W42, W62) and FCCC (MT45, MT55) walk-in/step vans available
 - GVWRs start at 14,000#; many small businesses use 7500-14000# strip chassis. Rely on Ford E350 strip chassis
 - Dry cleaners, some package delivery, utilities, contractors, etc

What Other Engines and Vehicle Platforms Are Needed?



- Medium-Duty LCF and Conventional Work Trucks
 - Chevy T-Series 6500-8500 (185-250 HP)
 - Ford LCF Series
 - Mitsubishi Fuso FE, FG, FK, FM series (145-250 HP)
 - Hino 145-338 models (175-260 HP)
- Short-Haul-Delivery, vocational/work trucks

What Other Engines and Vehicle Platforms Are Needed?



- Natural Gas-Electric Hybrid Transit Buses
 - Transit industry is “high” on hybrids (diesel-electric). Natural gas is perceived as lagging in new transit technology; We need more coordinated effort at integration of systems...current attempts have had multiple problems
- Natural Gas-Hydrogen blends
 - Earlier efforts seem to have “fizzled”

What Other Engines and Vehicle Platforms Are Needed?



- Re Ports: Ottawa, Capacity successfully demonstrated a yard hostler with CWI 8.3L C Gas Plus in limited number of units but elimination of C Gas Plus halted further units
- Re Other Specialty/Vocational work trucks: Cement mixers, cranes and other vehicle typically operating in urban environment (very visible)

Market Panelists

- Gordon Larsen, Questar Gas
- Steve Anthony, Southern California Gas/Sempra
- Kevin Markey, Applied LNG Technologies (ALT)

Questions/Comments?

Thank you